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THE DETERMINANTS OF CAPITAL STRUCTURE IN LATIN AMERICA:  
NEW EVIDENCE USING FIRM AND COUNTRY VARIABLES

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**Abstract**

The literature on capital structure determinants is extensive, so contributing to the field with both new variables that authors generally haven't thought about to a geography that is not known as much as the United States and Europe seemed a good idea. The region has many specificities, especially at the institutional and macroeconomy level. Results show that the coefficients signs of Profitability and Tangibility are the same as the rest of the world, but we a higher magnitude. An ambiguity before, inflation indeed negatively affects leverage. Also, the more developed the financial environment, the higher the leverage.

Keywords: Capital Structure; Leverage; Country factors; Latin America

## **I. Motivation**

This study is about the determinants of capital structure in Latin America. In order to bring new knowledge to the field, this will consist first by testing the previously published results, see if they apply for this specific region and add later some variables in order to provide evidence of other possible determinants that explain how firms on this region finance their activities, which could benefit both academics and practitioners. According to a recent study from law firm Baker McKenzie (2018), there are good prospects for the mergers and acquisitions market in this region, and by better understanding the capital structure of these firms (and its discount rate), a more realistic valuation could be reached. A higher emphasis will be given to the institutional environment as it shapes the degree of economic development and growth of countries, driving decisions taken by businesses.

The region is known to be a place of political and economic vulnerability. In order to see if there are firm and country characteristics that reflect this context, companies from the six larger economies (Brazil, Mexico, Argentina, Colombia, Chile and Peru) will be gathered.

The area is characterized by high inequality and corruption. Examples of economic issues include currency volatility, trade uncertainty and lack of infrastructure. Argentina and Brazil are members of the MERCOSUR, the main trade bloc in the region, with the other countries being somehow partners as well. These economies strongly rely on sectors such as Agriculture, Mining and Oil & Gas, being exposed to their commodity price fluctuations.

## **II. Theoretical Introduction**

Capital structure is the combination of debt, equity or other hybrid securities which is used to finance the daily run businesses. This topic has a long collection of studies that try to find out its determinants and how managers decided between the different financing option.

Modigliani and Miller (1958) built the corner stone of capital structure by using plenty of perfect and efficient market assumptions. Conclusions: (a) it is irrelevant to use debt or equity; (b) the higher the leverage, the higher the return on equity (increased risk premium), even though overall firm risk and discount rate keeps the same value. In Modigliani and Miller (1963) the existence of taxes is now taken into consideration. As interest payments are tax deductible, using debt leads to a higher firm value due to Tax Shield. Also, the Weighted Average Cost of Capital decreases due to the effect of taxes. Fully financing the firm with debt would be the optimal capital structure.

Some authors (ex: Kraus and Litzenberger (1973)), decided to go further and included bankruptcy costs in the model as it should be accounted when calculating the value of the levered firm. These costs include hiring lawyers, paying courts and selling assets, among others. Agency costs must also be taken in consideration. The cash flows might not be strong enough to pay interests plus principal. Managers decide to use debt until its marginal benefits equals its marginal costs, reaching an optimal capital structure, as defended in the Static Trade-off Theory. Symmetric information and efficient markets still hold here.

Later, Myers (1984) argues that although the Trade-off approach seems to be “moderate”, as it does not show a solid  $R^2$ . Also, there are transactions and issuing costs which make the constant adaptation to a new optimum a hard task. He states that firms have priorities when it comes to financing: first, internal funds, then debt issuance (cheaper, riskless and generates a tax shield) while also demonstrating discipline in the generation of steady future cash flows, which remind us the “Informational Role of Debt”, from Harris and Raviv (1990), and finally equity. The Pecking Order Theory says that equity makes the managers share their ownership and signals to the outside investor a low confidence toward the firm generating cash flows strong enough to pay for debt obligations.

Another important theory is the Management Entrenchment Theory, from Zwiebel (1996), in which managers use leverage in order to empire-build (i.e. to have more control over the decisions of the firm). This way, the capital structure does not have an optimum that is shareholder oriented, but rather managerial oriented. By taking excess leverage, managers are putting the company and shareholders under higher risk. Studies also point to a theory called Market Timing, in which managers do not give that much importance to what type of financing that is used, but when it must be done, according to their current valuation on the market. As Baker and Wurgler (2002) says: "...capital structure is largely the cumulative outcome of past attempts to time the equity market."

### **III. Literature Review**

To start with, Titman and Wessels (1988) differentiates itself from others as it uses short-term, long-term and convertible debt measures, instead of aggregate ones. It introduces the topic by criticizing the methodology of some researches, stating that some variables are chosen as proxies in order to bring better statistical measurements to the studies, as well as saying that some independent variables might be related to each other. Some interesting new variables were included such as R&D and depreciation. Conclusions include: smaller firms prefer short-term leverage, probably due to higher costs of raising long-term capital.

Another piece of research (Rajan and Zingales (1995)) begins by stating that, even after many studies (mostly in the United States), there is a lack of evidence from an empirical point of view about the relevance of capital structure. In this case, seeking evidence from other developed markets is the main goal of this study. Differences in accounting, legal and institutional practices must be taken into consideration to measure leverage and its determinants. The authors give special relevance to taxes, bankruptcy codes, market for corporate control, role played by banks and securities markets. Even though the author tries to compare the balance sheets and

different leverage measures from country to country, this current work will make a more standard and simple approach. As a conclusion, the authors find that there is a similar pattern of leverage across the G7 countries, and it is hard to compare the effects of institutional variables between different countries. The author states that leverage increases with firm specific factors such as size, taxes and tangibility, while it decreases with investment opportunities and profitability.

The first relevant paper that looks at non-developed countries is Booth et al. (2001), which looks across the globe in order to test if the firm and country-specific variables can be applied everywhere. The authors state some difficulties when it comes to using the data and deciding a methodology for the analysis, such as the not existence of proxies for important factors and different number of observations for different variables. One of the results, similar to the others, is that profitability has a negative impact on leverage, which might suggest that the Pecking Order Theory is applied here, as there is plenty of agency and information asymmetries in these countries. Also, the higher tangibility of assets is once again a factor that increases leverage. But the main conclusion of the study is this: while firm specific factors are generally similar across the world, country factors differ significantly.

The paper from Desai et al (2004) seems to be very specific and it gives some interesting insights about capital structure. The authors tried to find out how overseas affiliates of American firms finance themselves: internally (recurring to the parent company) or externally (through the debt and equity markets in which they are inserted)? The main conclusion is that “Multinational firms appear to employ internal capital markets opportunistically to overcome imperfections in external capital markets”. The study innovates in this field of knowledge by testing new variables such as Creditor Rights and Capital Market Depth. One of the difficulties faced was the fact that it is hard to compare financial variables between countries that have different accounting procedures. A few results include a positive relation between leverage and

interest rates, creditor rights and political risk; negative relations include inflation, profitability and capital market depth.

From all papers chosen, the one from De Jong et al. (2008) seems to be the closer to what will be studied in this research. The article says that country-specific factors influence leverage directly (capital market conditions) and indirectly (it affects firm-specific factors). The data includes almost 12 thousand firms from 42 developing and developed countries over a five-year period. The authors studied possible firm-specific factors such as size, asset tangibility, profitability, firm risk and growth opportunities; for country-specific, it uses legal enforcement, shareholder/creditor protection, market/bank-based financial system, stock/bond market development and growth rate of the economy. Although their results follow the same pattern as the known literature, they noticed that some factors have the opposite effect as expected and a few factors differ from country to country. When it comes to country-specific factors, GDP growth, bond market development and creditor right protection have high impact on capital structure. This result work as a “role model” for advanced economies with strong level of legal development (United States and Europe), where firms are more likely to use debt financing. In order to compute the leverage of each firm, the authors used a standard approach which consists in  $(\text{Book Value of LT Debt})/(\text{Market Value of Total Assets})$ . They suggest that ST Debt have different determinants, leading to a very different end-result. It is mentioned that they used dummies for industry groups in order to check for robustness. Regarding the methodology, the authors run a regression for firm-specific factors and another for country-specific factors, as well as regressions for the country dummies (direct impact) and for country effects on firm factors (indirect impact).

To finish, Fan et al. (2012) focus on the institutional characteristics that influence capital structure choice. The main finding is that the institutional environment has a greater influence on the financing decisions of the firm than industry characteristics. Corruption and weaker laws

lead to a higher degree of leverage and shorter debt horizons. Another interesting insight is that the author emphasizes the influence of the suppliers of capital (i.e. investors), which may be related to the availability of government debt and level of deposits and savings. Economic development is positively related to leverage, as already mentioned above.

#### **IV. Data**

The study will be based on two main type of variables: Country- and firm-specific data. As told before, the countries of our study were chosen because they are the largest economies in the region. The sample period is between 2000 and 2017, as data before that was scarce, while trying to get the maximum amount of observations as possible. Also, yearly is the chosen frequency, as it is easier to find for country data. Data for firm factors were taken from Bloomberg. Firms chosen include the ones present in the countries' main stock indexes (158 in total). By mistake, there are 19 firms that are part of the S&P/BVL Peru General Index which were not included in the list. By taking the largest firms, we are ignoring possible differences in financing options between large and small firms. Financial institutions (banks and insurance firms) had to be deleted, as their business model and balance sheet differ significantly from firms in other industries. Rajan and Zingales (1995) also refer to the fact that these types of institutions must follow capital requirements, which affect their capital structure choice. Country variables were mostly taken from the World Bank, but also from other sources, which will be referenced as the data is described. There are four kind of variables in this study: control variables for firm specific factors, control variables for country specific factors, new variables for firm specific factors and new variables for country specific factors. Also, we would like to refer that all firm variables were "winsorized". A percentile is chosen (in our case, 0.001), and is applied symmetrically to the distribution. Everything that does not lie in between the 0.0005-0.9995 range, is considered an outlier, and the value of these outliers now assume the value of the respective upper or lower percentile. The referred percentile was chosen as it eliminates all



the book leverages higher than one, while switching the values for the lost number of observations possible. This percentile was applied to all other firm-specific variables for a matter of consistency. An alternative technique would be to “trim” the observations, i.e. to delete the outliers, but the previously mentioned authors demonstrated that winsorization gives us less biased results. Finally, one issue that is a big part of the study of De Jong et al. (2008) is that different independent variables have indirect effects on each other, multicollinearity is probably one issue on this work. Dependent variables can be seen in the Appendix (Table 1), both at country and regional level. Descriptive Statistics on both Dependent and Independent variables are on Table 2.

### Dependent Variables

Before defining our measures of leverage, we must keep in mind that there might be differences in accounting measures, what is and is not included in a specific entry (how depreciation is taken into account, for example), even if now countries follow a more standardized and international practice of accounting. We have no information whether the figures for firm-specific variables are from consolidated balance sheets (in which a group of firms report all the affiliates’ balance sheet in a single one) and we did not pay attention to firms from one country being part of the stock market in one country.

As we all know, book values reflect what accounting says, the historical value while market values tell us the valuation given to by the financial market. The differences between one and another might transmit what are the evolution of the firm and if it is doing better than what its accounting values say. Therefore, leverage ratios that base themselves on one or another reflect what debt looks like compared to the accounting figures and how debt is doing in comparison to the expectations of the market.

There are two measures of leverage on this study: **Book leverage**, which is total debt over total book value of assets. Although it is a measure widely used, De Jong et al. (2008) warn us that short-debt includes trade credit, whose determinants might be different than for the rest of debt, giving us distorted results. **Market leverage**, which is total debt over market value of assets (market value of assets equals book assets less book equity plus market capitalization).

In Fan et al. (2012), long-term debt over assets is used to measure the “durability” of debt, and to distinguish it from short-term debt. These two might be stronger or weaker according to different factors and geographies. Besides those, total liabilities over total assets is also used, but Rajan and Zingales (1995) clearly state that accounts payable and pension liabilities inflate the value of leverage, without being part of the financing strategy of the firm.

In Table 1 the reader\* can see both book and market values of median leverage for the whole region (our dependent variables) and for each country that are part of it. As shown, Brazil is the country with the highest level of leverage, for both, while Colombia has the lowest book leverage and Mexico has the lowest market leverage. The country with the largest difference between book and market leverage is Mexico, as well. In De Jong et al. (2008), which measures leverage levels by country, the values for market leverage are below ours, as they use Long-term Debt only instead of Total Debt. Booth et al. (2001), which analyses Brazil and Mexico, have higher values for total liabilities over assets and lower values for long term debt over assets. Fan et al. (2012), which uses the same measure of market leverage as we do, have higher values for Mexico, Brazil and Peru, and more or less the same for Chile; for long-term debt over assets, values look even higher than in our case (using total debt). Mexico and Chile engage more in long-term debt than Brazil and Chile. Rajan and Zingales (1995) use many forms of leverage, including total debt over book assets, the same as one of our measures, and has generally the same values for the most countries, except for Japan (lower).

### Independent Control Variables

For firm-specific variables, we have tangibility, measured as net fixed assets (or PPE - Property, Plant and Equipment) over book value of assets; this factor is generally accepted as having a positive impact on leverage, except for Booth et al. (2001); tangible assets serve as a collateral; the higher the tangibility, the lower is the risk that the lender is exposed to; also, tangibility could serve as an inverse proxy for bankruptcy costs. Profitability, which calculated as EBITDA over assets, is accepted as a negative coefficient in all literature; this is in line with the Pecking Order Theory: firms first use internal funds to finance themselves, and then look for debt and equity; an opposite idea is that, if the firm has strong cash flows, wouldn't it be better at making interest payments (i.e. issuing more debt)? This could be a topic for further research; as a matter of curiosity, De Jong et al. (2008) finds out that this coefficient is positive for Chilean firms. The logarithm of sales gives us the proxy for firm size; intuitively, the larger the firm, the higher its level of diversification, leading to lower probability of bankruptcy, impacting leverage in a positive way; besides that, bigger firms are probably more transparent and have steadier cashflows, leading to more debt; additionally, De Jong et al. (2008) says "in countries with lower [law] enforcement, the role of firm size as a proxy for information asymmetry alleviation is further enhanced.". To finish this paragraph, market-to-book ratio, denoted as growth opportunities by some authors, is defined as market over book value of the firm; this way, we can see the present perception and future expectations of the market about a certain firm; a value higher than one signs overvaluation or potential growth; a negative coefficient is expected, according to literature; once again, De Jong et al. (2008) tells us that if there is a perspective of growth, shareholders do not want to issue debt so that they can channel cashflows to themselves.

When it comes to country level variables, inflation, associated with uncertainty (GDP deflator) is a key one, especially when two of the chosen countries, Brazil and Mexico, have a track record of hyperinflation; according to previous studies, this variable is either insignificant or gives

ambiguous result. As one of the main advantages of issuing debt is the tax shields that could be generated, we use statutory (corporate) taxes as one of our variables; according to the theory, we expect that higher taxes lead to higher leverage; some authors use the corporate tax rate, while others use the effective tax rate from Miller (1977), which is a more accurate way to see its real impact on leverage, as it takes into account personal taxes on capital and dividend gains. Corruption, as an “illness” to society, certainly plays a role on leverage, as it increases uncertainty and makes institutions less reliable; the expected coefficient is negative; we took this variable from Transparency International, which issues a yearly report of its Corruption Perception Index. Domestic savings measures the availability of funds from investors, so that it could be invested in financial assets, as stated by Fan et al. (2012); the same author finds that it is negative for developing countries. Market cap of listed companies shows us the degree of the equity market, which negatively correlates with debt on Booth et al. (2001). GDP growth could signal where we are in the business cycle (when equity issues increase), but also signals good prospects for the economy and good cash flows, which could be used to make interest payments; this is a positive contribution to leverage, according to the same author as before. The last of this section, rule of law, should have a positive coefficient, as stronger law means more transparency, less corruption and a working judicial system (important for bankruptcy cases); this variable was taken from the World Governance Indicator, issued by the World Bank, and rule of law is one of the variables available; as stated in the report: “Reflects perceptions of the extent to which agents have confidence in and abide by the rules of society, and in particular the quality of contract enforcement, property rights, the police, and the courts, as well as the likelihood of crime and violence.”; all the rationale behind the variables is on Kaufmann et al. (2010).

### Independent (New) Variables

Now talking about new variables in order to test other eventual capital structure determinants, first for firm: one of the variables of our choice is the dividend payout ratio; this variable is inspired in the so called Dividend Signaling; it says that when a firm unexpectedly announces a dividend increase (decrease), future expectations regarding profitability are increased (decreased); although it is not 100% proved as theory (with many caveats), it is defended by many authors according to Bernheim and Wantz (1992); we expect it be positive correlated to leverage, as both dividend increase and leverage impose a stronger discipline on managers. We thought of another variable called effective interest rate, which is essentially all the interest payments divided by EBIT; this could show how much the spent in interest correlates with leverage, as the interest on debt payments is just one of the spending components of our variable; also, this explicit the true interest that the firm faces, and not the one established by the central bank (which will show in the next paragraph). The last firm variable in the effective tax rate (total tax spending over EBT), which once again seem to be a value for taxation closer to the reality of the firm, and not the one established on a country level; a positive relation is expected; De Jong et al. (2008) uses this measure instead of the standard one for Taxes, as gets a negative coefficient; let us test this to see the real sign.

For possible country variables that could further explain leverage we chose central government debt, as the working paper from Demirci et al. (2018) states that there is a negative relation between this and leverage; as the government issues debt, investors might seek these securities (as they are safer), and (big) firms may think about increase its amount of equity. Another variable is Foreign Direct Investment (FDI), which we expect to have a positive coefficient; FDI enhances growth on developing countries (Alfaro et al. (2004)), which could lead a safer environment where issuing debt seems a good option. As suggested by Booth et al. (2001), the volume of equity transactions demonstrates the level of development of the equity market

(therefore, imposing an opposite effect on leverage), so we use the value of all stocks traded over GDP as another variable. As a key macroeconomic indicator in any economy, the level of interest rate established by the central bank (without inflation) sets the standard for the interest on any financial activity (lending, borrowing, ...), so we expect negative value here. Probably, the most interesting variable of this paper is the one called “Financial Develop Index”; it was developed by the International Monetary Fund (Sviryzdenka (2016)), it takes into account the depth, access and efficiency of both the Financial Markets and Financial Institutions of a country; as the reader might suspect, this might be positive correlated with leverage; as a problem it must be certainly correlated to other variables that we wrote above (transaction on the equity market, for example). It is known from International Trade classes that the surplus in an economy increase with the level of openness, and that is why Trade (Exports plus Imports, divided by GDP) is another variable of that might generate a positive coefficient; the literature on this is extensive, with one example being David and Loewy (1998). The last country variable to be mentioned is the “Government Effectiveness”, also part of the World Bank study “Worldwide Governance Indicators”; as it describes the variable “Reflects perceptions of the quality of public services, the quality of the civil service and the degree of its independence from political pressures, the quality of policy formulation and implementation, and the credibility of the government's commitment to such policies.”; once again, a positive correlation is expected; this variable kind of translates the same as the one from the IMF, but orientated to the public sector in general, instead of the financial institutions.

## **V. Methodology**

As mentioned before, the first step towards treating the data was the winsorization of variables. The correlation between all the variables are presented in the Appendix (Tables 3.1-3.6), as it serves as a first step towards finding out whether our predictions are right. The next three paragraphs make use of these tables.

Regarding the control variables and book leverage, the ones that contradict the predictions stated on the Data section of this paper are market-to-book, corruption and GDP growth. The logarithm of sales (i.e. Size) and market capitalization of the listed companies are essentially zero. Inflation, which was the ambiguous variable, exhibits a positive behavior towards book leverage. All the others are according expectations. Now for control variables and market leverage, market-to-book is now in line with expectations, and corruption, inflation and economic growth keep the same signs as for book leverage. All else is remain the same. Magnitudes now seem to be a bit “far away” from zero.

Let us analyze the new variables in comparison to book leverage. Effective tax rate is negative. Central government debt, volume of stocks traded, and real interest rate are positive, going against what was previously thought. Trade has a negative correlation with book leverage. Government effectiveness is essentially zero. Everything else matches expectations. To finish, for the new variables and market leverage, real interest rate is now negative, while all the rest is similar to correlations with book leverage.

As a matter of curiosity, we can look at correlations between independent variables, especially between firm and country variables, which might translate indirect effects of these variables on leverage, being these one of the main contributions of De Jong et al. (2008). Unfortunately, the correlations presented do not seem to be consistent with his work. For example, rule of law is positive in relation to size (not expected), while corruption has a negative impact on profitability (expected). These results could motivate academics to research it in a deeper and methodical way.

The regression analysis of this paper heavily relies on two mentioned papers: Booth et al. (2001) and Fan et al. (2012). First, all the regressions presented were clustered at the firm-level in order to obtain unbiased estimates. This means that standard errors at the firm-level were treated in

order to obtain variables that are homoscedastic (i.e. do not have variation in errors) and do not have serial correlation (i.e. error terms are not correlated over time), which could be considered a way to get robust standard errors on a panel data model. This cluster was done through the “White cross-sectional” option in “Coefficient covariance method” available on EViews.

There are three methods of regressions used in this study: Pooled OLS, Period Fixed Effect, and Period and Cross-Sectional Fixed Effect. These were used for four different group of independent variables: Control Firm variables (1), Control Country variables (2), Control Firm and Country variables (3), and Control and New with Firm and Country variables (4). As the reader can perceive, the goal of the first three is to test the existing evidence for our aggregate sample of Latin American firms according to the respective variables, and the last one is intended to add new significant variables to the existing literature. All these were regressed against two dependent variables already mentioned in the Data: Book Leverage and Market Leverage. Twenty-four regressions in total.

Focusing on the regression methods. As a first step, Pooled OLS was used to estimate the above-mentioned models, due to its “simplicity”. This is an OLS model adapted to panel data. Here, any specific effect either from firm or period level are ignored. There are two regression intercepts for panel data models: one for cross sectional and one for period. In this first case, both are fixed. As the data is unbalanced (missing observations), this method does not generate the most “efficient or unbiased parameter estimates” (Booth et al. (2001)).

The second and third methods used to model the determinants of capital structure in Latin America are the so-called Fixed Effect models. These allow to either one or both intercepts to vary. In other words, we are “freezing” the effect of the Period, so that the changes in leverage are captured by the variation of the cross-sectional variables, independently of the time that we are analyzing. In the third model, the reader can find regressions fixed at both Period and Cross-



Sections, promoting coefficients that translate the aggregate effects of the independent variables on leverage, ignoring the individual characteristics of firms and time period chosen.

## **VI. Results**

The tables can be found in the Appendix section. Significance at the 10% level will be considered. The coefficients are on the right of the name of the variable, while the p-values for the respective value is below the coefficient. Non-significant p-values in red color.

Pooled OLS Regressions (Table 4): For regressions (1), which uses Control variables at the firm level, the best comparison might be with Ranjan and Zingales (1995), as they use the exact same variables. Size is not significant for both Book Leverage and Market Leverage. Tangibility and profitability follow the literature, with higher magnitudes in relation to Market Leverage; Adjusted  $R^2$  is way higher for Market Leverage (24%), which is also in line with the mentioned paper. Market-to-book is more in line with the literature for market values of leverage. For regressions (2), Taxes and Corruption are not significant, and GDP growth is not significant for Market Leverage. Inflation contributes negatively to the models and Savings show vigorous negative coefficients. Except for GDP growth, all the variables followed what were expected. Adjusted  $R^2$  here is lower than the one from Booth et al. (2001), which uses only macroeconomic variables. For regressions (3), using Control variables for both Firm and Country level, we do not reject the null for the same variables (Tax, Corruption and GDP growth (market leverage case)). Size is now significant, following the literature. Market-to-book is once again ambiguous. All the other variables are in line with expectations and the previous two cases. Let us test the “big model” (4), the one with both Control and New variables at firm and country level. Many variables that were used as control are now not significant (Rule of Law, GDP growth, Savings, Corruption and Inflation (Book case). Market-to-book is, for the third time, positive (book case) and negative (market case). Taxes have negative coefficients,

Inflation now has a positive effect. Regarding the new variables, Dividend payout ratio, Effective Interest Rate and Volume of stocks traded have a negative coefficient. Effective Tax Rate, Real Interest Rate and Financial Develop Index contribute positively to the both measures of leverage. For Foreign Direct Investment, Central Government Debt, Trade and Government Effectiveness the null is not rejected, making these not significant variables. Both Adjusted  $R^2$  demonstrate to be the highest of all the four models, even passing the ones from the literature.

Regressions with Year-Fixed Effect (Table 5): the ones in (1) look similar to the pooled case. Regression with (2) variables have insignificant values for Taxes, Corruption (market level) and Market Capitalization of Listed Companies (book level). Inflation and GDP growth have negative coefficients, while all the others seem to be in line with expectations. Corruption has a negative sign in the Book leverage regression. Regressions (3) have generally the same results as the regressions (1) and (2). For the regressions of (4), all the Control firm values are significant, and the only case that is not in line with expectations is, once again, the market-to-book ratio. Taxes, GDP growth, rule of law and corruption are not significant. Inflation is positive, similar to the pooled regressions. Central Government Debt and Trade are now significant, with the first following the literature results (negative coefficient). Volume of stocks traded is not significant now. Adjusted  $R^2$  are slightly higher for this Year-Fixed Effect case, with still a big difference between the cases with book and market leverage.

Regressions with Year- and Firm-Fixed Effects (Table 6): there are more non-rejected null hypothesis. Regressions (1) reveal the same results as before, except for the non-significance of market-to-book ratio in the book leverage model. For (2), corruption is now significant with a negative sign, savings are also not significant; it is, in fact, the only significant variable of the book leverage case. Regressions in (3) have the same results for corruption as in (2). The firm and country variables have, respectively, the essentially the same output as the regressions of (1) and (2). Regressions for (4), inflation has a positive impact on leverage, Market

Capitalization of firms is negative. Taxes, as in the pooled regressions, are significant and have a negative coefficient. From all the new variables suggested, the only two significant are the Financial Development Index and the Effective Interest Rate. Adjusted  $R^2$  seem to be inflated in this third round of regressions.

## **VII. Analysis of the Results**

First, let us compare the control tests with the existing literature. Profitability and Tangibility are always significant, in all cases, and coefficients are generally higher than the ones from Fan et al. (2012). Size is also significant in most of times, but coefficients are very low, similar to the previous paper. Market-to-book ratio is always positive for book leverage, and negative for market-leverage (in line with the literature); this difference could be a target for future research. Taxes are mostly non-significant; this may be due to the fact that it has the lowest number of observations compared to the other variables. Inflation is always negative; its coefficient is in line with the values for the developing economies in Fan et al. (2012), which in turn are higher than for the developed economies. Corruption is generally not a significant value; when it is (mostly the two effects), it is negative, which is the expected sign. Gross savings, when significant, are negative, with the magnitude of the coefficients being enormously higher than the one from the cited paper. Market capitalization of firms in relation over GDP follow the predictions. The first case of a solid results that is against expectations is the one for GDP growth, which has a negative sign (but the magnitudes are less than half), contradicting Booth et al. (2012); is it because there is higher volatility in these countries, so managers expect a recession in the near future, even if today the economy is thriving? Once again, this could be a topic for further investigation. We based our predictions for the coefficient for the Rule of Law used in De Jong et al. (2008) and, even though we use it as any other variable in our regressions (but it is viewed by those authors as having an indirect impact on leverage) we reached a positive sign as well.

Now turning the attention of the reader to the variables that can potentially influence leverage in Latin America. When running regressions for type of variables (4), results seem strange. Some Control variables that were significant are not now (and vice-versa), and even flipping the sign for inflation, especially for the pooled OLS regressions. Dividend Payout Ratio are significant, although they have a low magnitude; coefficient is negative, which contradicts our intuition, and only next studies can find out the cause of this. Effective interest rates have zero as p-value; but how much from that interest comes only from debt, and not from other sources (trade credit, interest from installments of real estate)? This variable should had been studied more carefully before being applied to the model, so that the coefficient could actually tell us something new. The case for Effective Tax Rate is similar: how much of that debt comes from debt, and not from taxes on products sold? As it has a positive sign, it would be in line with our expectations for Statutory Corporate Taxes, or effective taxes (used in other papers); De Jong et al. (2008) uses this measure for taxes, and his results are (mostly) not in line with ours and from other literature. The Year-Fixed Effect regressions for variables (4) lead us to a significant and negative coefficient for central government debt, confirming the study from Demirci et al. (2016). FDI in never a significant explanatory variable. The volume of stocks traded over GDP is only significant for pooled OLS case and is a negative contribution to leverage, as predicted (when investors “seek” the equity market, the debt one is less relevant). Real Interest Rate has a positive effect on leverage, and the reason is possibly because when the economy is doing good, central bankers raise interest rates (and vice-versa), but borrowing becomes more expensive as well, which is clearly a case of ambiguity. The Financial Development Index from the IMF not just have significant coefficients in all regressions, but also considerable magnitudes; as this variable gathers financial market financial institutions information, it could alone be a proxy for many variables that are both control and new; so, as the financial environment develops in the region, more managers will want to issue debt. In half of the

regressions trade is not significant, and on others it contributes negatively to debt; contrary to the initial rationing, openness of the economy might lead to investors and firm to use more the equity market. Government effectiveness does not generate results.

### **VIII. Conclusion**

Although this region has a specific institutional and business environment compared to the rest of the world and, especially, the developed world, the determinants of capital structure does not vary abruptly. From the control variables used, either on the firm or country side (or both), the results are similar. We found out that Tangibility, Profitability and Savings not only are in line with previous studies at the sign level, but the magnitude of the coefficients are considerably higher, being these a differential in relation to other geographies. We can say that inflation does influence the leverage of Latin American firms in a positive way. Further research lies on market-to-book ratio (ambiguity) and GDP growth (opposite sign).

New variables seem to arise as possible determinants of capital structure in the region. On the macroeconomic level, real interest rates (even if ambiguous) and volume of traded stocks (demand of equity from investors). On the institutional side, the Financial Development Index produced by the IMF seems to be a good representative of many factors, and confirming the prediction that financial development lead to higher leverage.

In order to have better results in the future, compared to this paper, the winsorization should be made at the 1% level and multicollinearity must be analyzed, as it certainly influenced the coefficients, overestimating them. Also, we could had found relevant effects of corporate taxes, but the number of observations was lower than the other variables. Comparing the different types of rejections made, the Year-Fixed Effects seems to be “better”, as it ignores the time component that might be attached to the leverage levels and independent variables, while not rejecting that many p-values as the regressions with both Fixed Effects (not forgetting the

“inflated”  $R^2$ ), and it also gives higher  $R^2$  compared to pooled OLS regressions. Besides that, the literature that we based this study on prefer Fixed Effects at one level only.

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## X. Appendix

Table 1 – Leverage by country

	Mean		Median		Standard Deviation	
	Book Leverage	Market Leverage	Book Leverage	Market Leverage	Book Leverage	Market Leverage
Argentina	0,31	0,27	0,27	0,19	0,21	0,22
Brazil	0,33	0,26	0,32	0,24	0,15	0,15
Chile	0,30	0,24	0,30	0,22	0,10	0,13
Colombia	0,24	0,23	0,24	0,23	0,14	0,14
Mexico	0,25	0,18	0,25	0,15	0,14	0,13
Peru	0,26	0,21	0,27	0,18	0,14	0,17
Region	0,29	0,24	0,29	0,21	0,15	0,16

Table 2 – Descriptive Statistics

	Mean	Median	Maximum	Minimum	Observations
Book Leverage	0,29	0,29	1,00	0,00	2381
Market Leverage	0,24	0,21	0,90	0,00	2217
Tangibility	0,41	0,41	0,94	0,00	2441
Profitability	0,14	0,13	1,06	-0,28	2414
Size	7,44	7,45	11,89	-0,09	2428
Market-to-book	2,51	1,73	50,04	-8,09	2265
Tax	0,30	0,33	0,40	0,17	1385
Inflation	0,07	0,06	0,40	-0,01	2844
Corruption	4,14	3,70	7,50	2,50	2844
Savings	0,19	0,18	0,25	0,12	2844
Market Caps	0,49	0,41	1,56	0,06	2769
GDP growth	0,03	0,03	0,10	-0,11	2844
Rule of Law	-0,14	-0,36	1,43	-0,89	2686
Dividend	0,66	0,38	78,25	0,00	1814
Eff Interest	2,13	0,08	827,77	-0,03	2310
Eff Tax	0,56	0,28	136,46	0,00	2372
Gov Debt	0,43	0,38	1,52	0,04	2686
FDI	0,04	0,03	0,11	0,01	2844
Stocks Traded	0,14	0,10	0,46	0,00	2844
Real Interest	0,17	0,10	0,48	-0,11	2724
Fin Dev Index	0,42	0,41	0,61	0,20	2686
Trade	0,42	0,37	0,81	0,22	2844
Gov Effectiv	0,11	-0,05	1,28	-0,67	2686

Table 3.1 – Correlation Matrix

Correlation Matrix	Book Leverage	Market Leverage	Tangibility	Profit	Size
Book Leverage	1,0000				
Market Leverage	0,7572	1,0000			
Tangibility	0,1262	0,2151	1,0000		
Profit	-0,1641	-0,3773	0,0429	1,0000	
Size	0,0002	0,0270	0,0278	0,0193	1,0000
Market-to-book	0,0349	-0,3314	-0,1393	0,3277	-0,0086
Tax	0,0360	0,0175	-0,1958	0,0696	0,0582
Inflation	0,0322	0,0361	0,0645	-0,0057	-0,0668
Corruption	0,0362	0,0437	0,1278	-0,1522	0,0119
Gross Savings	-0,1306	-0,2046	0,0997	0,0911	0,0061
Market Caps	-0,0060	-0,1049	0,0267	-0,0974	0,0812
GDP growth	-0,0883	-0,1420	0,0554	0,1246	-0,0875
Rule of Law	0,0574	0,0529	0,0928	-0,1658	0,0822
Dividend	0,0082	0,0287	0,0348	-0,0029	0,0146
Eff Interest	-0,0712	-0,0466	-0,0836	0,0244	-0,0590
Eff Tax	-0,0064	-0,0115	0,0476	-0,0429	-0,0397
Gov Debt	0,1869	0,1835	-0,1065	0,0362	-0,0182
FDI	0,0105	0,0174	0,0562	-0,0757	0,0686
Stocks Traded	0,0990	-0,0120	-0,2392	-0,0604	0,2814
Real Interest	0,1489	0,1472	-0,1517	0,0479	0,0443
Fin Develop Index	0,1450	0,0469	-0,2144	-0,1115	0,3457
Trade	-0,1108	-0,1540	0,1593	0,0263	-0,0233
Gov Effectiv	0,0071	-0,0045	0,1593	-0,1324	0,0545

Table 3.2 – Correlation Matrix

Correlation Matrix	Market-to-book	Tax	Inflation	Corruption	Gross Savings
Book Leverage					
Market Leverage					
Tangibility					
Profit					
Size					
Market-to-book	1,0000				
Tax	0,1085	1,0000			
Inflation	0,0548	0,3825	1,0000		
Corruption	-0,0730	-0,7661	-0,2170	1,0000	
Gross Savings	-0,0068	-0,6264	-0,2965	0,3053	1,0000
Market Caps	0,0511	-0,7047	-0,2879	0,7462	0,3825
GDP growth	0,0196	-0,1747	-0,1340	0,0606	0,3478
Rule of Law	-0,0566	-0,7234	-0,2204	0,9632	0,2781
Dividend	-0,0173	0,0463	0,0428	-0,0333	-0,0429
Eff Interest	0,0283	0,0136	-0,0139	-0,0249	0,0475
Eff Tax	0,0136	0,0557	0,1470	-0,0368	-0,0342
Gov Debt	0,0513	0,7997	0,3667	-0,4995	-0,5979
FDI	-0,0721	-0,7254	-0,3500	0,7225	0,3367
Stocks Traded	0,1495	0,2765	-0,1013	0,0914	-0,2143
Real Interest	0,0572	0,4796	-0,1486	-0,1864	-0,6186
Fin Develop Index	0,1086	0,1316	-0,0685	0,2822	-0,0994
Trade	-0,0461	-0,7292	-0,2961	0,4636	0,8290
Gov Effectiv	-0,0701	-0,8673	-0,1535	0,8728	0,4511

Table 3.3 – Correlation Matrix

Correlation Matrix	Market Caps	GDP growth	Rule of Law	Dividend	Eff Interest
Book Leverage					
Market Leverage					
Tangibility					
Profit					
Size					
Market-to-book					
Tax					
Inflation					
Corruption					
Gross Savings					
Market Caps	1,0000				
GDP growth	0,2390	1,0000			
Rule of Law	0,7767	0,0370	1,0000		
Dividend	-0,0498	-0,0337	-0,0408	1,0000	
Eff Interest	-0,0190	-0,0127	-0,0226	-0,0043	1,0000
Eff Tax	-0,0693	-0,0204	-0,0477	0,1371	-0,0029
Gov Debt	-0,3675	-0,1893	-0,4301	0,0398	-0,0095
FDI	0,5948	0,1812	0,7243	-0,0403	-0,0359
Stocks Traded	0,4192	-0,0470	0,2336	0,0003	0,0040
Real Interest	-0,0640	-0,1275	-0,1514	0,0005	-0,0268
Fin Develop Index	0,4500	-0,1367	0,4403	-0,0087	0,0125
Trade	0,3639	0,1874	0,4181	-0,0500	0,0190
Gov Effective	0,6616	0,0511	0,8879	-0,0454	-7,8572

Table 3.4 – Correlation Matrix

Correlation Matrix	Eff Tax	Gov Debt	FDI	Stocks Traded
Book Leverage				
Market Leverage				
Tangibility				
Profit				
Size				
Market-to-book				
Tax				
Inflation				
Corruption				
Gross Savings				
Market Caps				
GDP growth				
Rule of Law				
Dividend				
Eff Interest				
Eff Tax	1,0000			
Gov Debt	-0,0004	1,0000		
FDI	-0,0462	-0,4817	1,0000	
Stocks Traded	-0,0563	0,3276	0,0749	1,0000
Real Interest	-0,0664	0,6366	-0,1334	0,5363
Fin Develop Index	-0,0519	0,2408	0,2370	0,8754
Trade	-0,0313	-0,7484	0,4510	-0,3830
Gov Effectiv	-0,0351	-0,5472	0,6258	-0,0168

Table 3.5 – Correlation Matrix

Correlation Matrix	Real Interest	Fin Develop Index	Trade	Gov Eff
Book Leverage				
Market Leverage				
Tangibility				
Profit				
Size				
Market-to-book				
Tax				
Inflation				
Corruption				
Gross Savings				
Market Caps				
GDP growth				
Rule of Law				
Dividend				
Eff Interest				
Eff Tax				
Gov Debt				
FDI				
Stocks Traded				
Real Interest	1,0000			
Fin Develop Index	0,4052	1,0000		
Trade	-0,6862	-0,2475	1,0000	
Gov Effectiv	-0,3889	0,2191	0,6479	1,0000

Table 4 – Pooled OLS (coefficients on the right of variable, p-value below coefficient)

	(1)		(2)		(3)		(4)	
	Book Leverage	Market Leverage	Book Leverage	Market Leverage	Book Leverage	Market Leverage	Book Leverage	Market Leverage
Tangibility	0,0960	0,1423			0,0997	0,0994	0,1341	0,1133
	0,0000	0,0000			0,0000	0,0000	0,0000	0,0000
Profitability	-0,3914	-0,6223			-0,3179	-0,6322	-0,4346	-0,6659
	0,0000	0,0000			0,0000	0,0000	0,0000	0,0000
Size	0,0030	0,0040			0,0074	0,0185	0,0051	0,0162
	0,2003	0,3114			0,0000	0,0000	0,0095	0,0000
Market-to-book	0,0056	-0,0102			0,0076	-0,0050	0,0184	-0,0032
	0,0000	0,0001			0,0000	0,0035	0,0000	0,0214
Tax			0,0819	-0,2172	0,1955	-0,0297	-0,4792	-0,4784
			0,7034	0,3700	0,3638	0,9057	0,0107	0,0281
Inflation			-0,2823	-0,3759	-0,3610	-0,3255	0,0857	0,2115
			0,0001	0,0001	0,0000	0,0000	0,1915	0,0038
Corruption			-0,0133	-0,0110	-0,0106	0,0001	-0,0035	-0,0052
			0,1842	0,3652	0,2726	0,9924	0,7538	0,6975
Savings			-0,7166	-1,0416	-0,5800	-0,7661	-0,2036	-0,0032
			0,0009	0,0001	0,0149	0,0030	0,3521	0,9873
Market Caps			-0,0682	-0,1600	-0,0878	-0,1509	-0,0773	-0,1117
			0,0047	0,0000	0,0033	0,0000	0,0122	0,0026
GDP Growth			-0,2894	-0,1899	-0,2536	-0,0760	-0,0496	0,0574
			0,0298	0,1174	0,0806	0,4883	0,6702	0,6358
Rule of Law			0,0780	0,0975	0,0765	0,0617	-0,0007	0,0300
			0,0002	0,0002	0,0001	0,0085	0,9754	0,3444
Dividend							-0,0032	-0,0028
							0,0189	0,0265
Eff Interest							-0,5461	-0,3614
							0,0000	0,0000
Eff Tax							0,0350	0,0343
							0,0051	0,0019
Gov Debt							0,0211	-0,0765
							0,8059	0,3700
FDI							-0,1253	-0,3648
							0,3131	0,1138
Stocks Traded							-0,2676	-0,3726
							0,0074	0,0000
Real Interest							0,2196	0,3525
							0,0001	0,0000
Fin Dev Index							0,5708	0,5696
							0,0000	0,0000
Trade							0,0517	0,0076
							0,1753	0,8348
Gov Eff							-0,0003	-0,0229
							0,9920	0,4236
Adjusted R <sup>2</sup>	0,0591	0,2399	0,0544	0,1071	0,1220	0,3489	0,1429	0,4267
Observations	2184	2184	1360	1314	1297	1297	856	856

Table 5 – Year-Fixed Effects (coefficients on the right of variable, p-value below coefficient)

	(1)		(2)		(3)		(4)	
	Book Leverage	Market Leverage	Book Leverage	Market Leverage	Book Leverage	Market Leverage	Book Leverage	Market Leverage
Tangibility	0,0954	0,1240			0,1043	0,0994	0,1398	0,1171
	0,0000	0,0000			0,0000	0,0000	0,0000	0,0000
Profitability	-0,3875	-0,6537			-0,3128	-0,6322	-0,4231	-0,6699
	0,0000	0,0000			0,0000	0,0000	0,0000	0,0000
Size	0,0036	0,0085			0,0069	0,0185	0,0053	0,0165
	0,1215	0,0079			0,0000	0,0000	0,0058	0,0000
Market-to-book	0,0064	-0,0078			0,0074	-0,0050	0,0182	-0,0031
	0,0001	0,0001			0,0000	0,0035	0,0000	0,0298
Tax			0,2456	-0,2125	0,3181	-0,0297	-0,3097	-0,2322
			0,3504	0,5075	0,2560	0,9057	0,1403	0,3378
Inflation			-0,2107	-0,3696	-0,3029	-0,3255	0,1747	0,2314
			0,0001	0,0001	0,0000	0,0000	0,0309	0,0025
Corruption			-0,0246	-0,0080	-0,0202	0,0001	-0,0102	-0,0017
			0,0589	0,6624	0,1432	0,9924	0,4262	0,8815
Savings			-0,4621	-1,0487	-0,4055	-0,7661	0,3307	0,5542
			0,0774	0,0010	0,1653	0,0030	0,1256	0,0280
Market Caps			0,0036	-0,1039	-0,0029	-0,1509	-0,0569	-0,0857
			0,8353	0,0120	0,8817	0,0000	0,0478	0,0064
GDP Growth			-0,3883	-0,4820	-0,4846	-0,0760	-0,0758	0,0493
			0,0037	0,0126	0,0022	0,4883	0,4371	0,6522
Rule of Law			0,0816	0,0707	0,0699	0,0617	-0,0130	0,0022
			0,0014	0,0542	0,0091	0,0085	0,6391	0,9195
Dividend							-0,0033	-0,0029
							0,0183	0,0249
Eff Interest							-0,5363	-0,3519
							0,0000	0,0000
Eff Tax							0,0336	0,0326
							0,0093	0,0040
Gov Debt							-0,1597	-0,2134
							0,0745	0,0256
FDI							0,0493	-0,1052
							0,8362	0,7148
Stocks Traded							-0,0588	-0,1601
							0,5313	0,1025
Real Interest							0,2463	0,3107
							0,0000	0,0000
Fin Dev Index							0,4668	0,4581
							0,0002	0,0031
Trade							-0,0887	-0,1472
							0,0313	0,0007
Gov Eff							0,0098	-0,0123
							0,7446	0,5763
Adjusted R <sup>2</sup>	0,073765	0,30043	0,0713	0,1087	0,1177	0,3433	0,2825	0,4286
Observations	2184	2184	1360	1314	1297	1297	856	856



Table 6 - Year- and Firm-Fixed Effects (coefficients on the right of variable, p-value below coefficient)

	(1)		(2)		(3)		(4)	
	Book Leverage	Market Leverage	Book Leverage	Market Leverage	Book Leverage	Market Leverage	Book Leverage	Market Leverage
Tangibility	0,0482	0,1301			0,0827	0,1132	0,1024	0,1594
	0,0822	0,0010			0,0041	0,0019	0,0009	0,0019
Profitability	-0,3768	-0,5343			-0,3506	-0,5005	-0,4121	-0,5618
	0,0000	0,0000			0,0000	0,0000	0,0000	0,0000
Size	0,0361	0,0326			0,0302	0,0172	0,0520	0,0237
	0,0000	0,0000			0,0000	0,0032	0,0000	0,0395
Market-to-book	0,0017	-0,0088			0,0031	-0,0052	0,0090	-0,0079
	0,1576	0,0000			0,0000	0,0005	0,0000	0,0000
Tax			-0,2951	-0,3517	-0,2652	-0,2841	-0,3918	-0,4668
			0,2034	0,1341	0,2071	0,1580	0,0015	0,0114
Inflation			-0,0530	0,0256	-0,0881	0,1251	0,2456	0,2598
			0,7995	0,7995	0,6492	0,0529	0,0079	0,0010
Corruption			-0,0347	-0,0438	-0,0297	-0,0311	-0,0070	-0,0168
			0,0896	0,0000	0,0895	0,0015	0,5572	0,2699
Savings			0,0405	0,1521	0,1249	0,0384	-0,1992	-0,0632
			0,8883	0,5251	0,6959	0,8680	0,2764	0,7152
Market Caps			-0,0359	-0,1558	-0,0312	-0,1382	-0,0057	-0,0843
			0,2430	0,0000	0,2833	0,0000	0,9010	0,0545
GDP Growth			-0,1378	-0,4114	-0,1846	-0,3260	0,0246	-0,0162
			0,3452	0,0000	0,1577	0,0000	0,8694	0,9004
Rule of Law			0,0202	0,0309	-0,0125	0,0434	0,0218	0,0512
			0,5341	0,1181	0,7194	0,0000	0,5949	0,0513
Dividend							-0,0006	-0,0006
							0,4422	0,4676
Eff Interest							-0,3394	-0,1488
							0,0000	0,0162
Eff Tax							-0,0014	0,0039
							0,8631	0,6356
Gov Debt							0,0263	0,0493
							0,7608	0,6707
FDI							-0,2484	-0,1443
							0,4036	0,5473
Stocks Traded							-0,1346	-0,1288
							0,2761	0,1944
Real Interest							0,1591	0,0923
							0,1369	0,0483
Fin Dev Index							0,4838	0,3970
							0,0003	0,0126
Trade							-0,0030	-0,1000
							0,9701	0,0658
Gov Eff							-0,0450	-0,0514
							0,1969	0,1446
Adjusted R <sup>2</sup>	0,5828	0,6620	0,7150	0,7429	0,7345	0,8012	0,8294	0,8215
Observations	2184	2184	1360	1314	1297	1297	856	856